CLAIMS

1. A method of improving a thermal stability for cobalt salicide, comprising:

providing a substrate having a silicon layer thereon;

forming a cobalt layer over the silicon layer;

forming a TiN_x layer over the cobalt layer;

performing a first thermal process to form a cobalt salicide layer over the silicon layer; and

removing a non-reactive cobalt layer,

wherein the TiN_x layer includes x atoms of nitrogen for each atom of titanium in a TiN_x molecule, and a value of x is greater than 0.9.

2. The method of claim 1, further comprising:

performing a second thermal process,

wherein the second thermal process is performed after the removing of the non-reactive cobalt layer.

3. The method of claim 1, wherein the TiN_x layer is formed by a sputtering process.

4. The method of claim 3, wherein a gas used in the sputtering process comprises N_2 and Ar.

5. The method of claim 4, wherein a ratio of N_2 to Ar in the gas used in the sputtering process is approximately 3:1.

6. The method of claim 1, wherein the TiN_x layer is formed to a thickness in a range of approximately 25 angstroms to approximately 100 angstroms.

7. A method of forming cobalt salicide, comprising:

providing a layer of silicon;

forming a layer of cobalt over the layer of silicon;

forming a layer of TiN_x over the layer of cobalt, wherein a value of x is greater than 0.9; and

performing a first thermal process to form a layer of cobalt salicide over the layer of silicon.

8. The method of claim 7, further comprising:

removing a layer of non-reactive cobalt; and

performing a second thermal process, the second thermal process being performed to decrease a resistance of cobalt salicide formed in the performing of the first thermal process.

9. The method of claim 7, wherein the forming of the layer of TiN_x is by a sputtering process.

10. The method of claim 9, wherein the sputtering process is accomplished with a gas comprised of N_2 and Ar.

11. The method of claim 10, wherein the ratio of N_2 to Ar in the gas comprised of N_2 and Ar is approximately 3:1.

12. The method of claim 1, wherein the TiN_x layer is formed to a thickness in a range of approximately 25 angstroms to approximately 100 angstroms.

13. A method for forming cobalt salicide having improved thermal stability, comprising:

providing a silicon layer, the silicon layer being one of a substrate formed of silicon and a layer of silicon formed over a substrate;

forming a cobalt layer over the silicon layer;

forming a TiN_x layer over the cobalt layer, wherein a value of x is greater than 0.9;

performing a first thermal process, the first thermal process reacting the cobalt layer to form a layer of cobalt salicide;

removing any unreacted cobalt; and

performing a second thermal process to reduce a resistance of cobalt salicide formed in the performing of the first thermal process.

14. The method of claim 13, wherein the TiN_x layer is formed over the cobalt layer by performing a sputtering process.

15. The method of claim 14, wherein the sputtering process is performed with a gas comprising N_2 and Ar.

16. The method of claim 15 where the ratio of N_2 to Ar in the gas comprising N_2 and Ar is approximately 3:1.

17. The method of claim 13, wherein the TiN_x layer is formed over the cobalt layer to a thickness in a range of approximately 25 angstroms to approximately 100 angstroms.